



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<p>(51) International Patent Classification ⁶ : A61B 17/39, A61M 25/01</p>	<p>A3</p>	<p>(11) International Publication Number: WO 99/47058 (43) International Publication Date: 23 September 1999 (23.09.99)</p>
<p>(21) International Application Number: PCT/US99/06092 (22) International Filing Date: 19 March 1999 (19.03.99) (30) Priority Data: 60/078,545 19 March 1998 (19.03.98) US (63) Related by Continuation (CON) or Continuation-in-Part (CIP) to Earlier Application US 60/078,545 (CIP) Filed on 19 March 1998 (19.03.98) (71) Applicant (for all designated States except US): ORATEC INTERVENTIONS, INC. [US/US]; 3700 Haven Court, Menlo Park, CA 94025 (US). (72) Inventors; and (75) Inventors/Applicants (for US only): ASHLEY, John, E. [US/US]; 184 Burlwood Drive, San Francisco, CA 94127 (US). SHARKEY, Hugh, R. [US/US]; 150 Normandy Lane, Woodside, CA 04062 (US). SAAL, Joel [US/US]; 46 Vista Verde Way, Portola Valley, CA 94028 (US). SAAL, Jeffrey [US/US]; 95 Sausal Drive, Portola Valley, CA 94028 (US).</p>		<p>(74) Agent: CARY, Charles, C.; Wilson Sonsini Goodrich & Rosati, 650 Page Mill Road, Palo Alto, CA 94304-1050 (US). (81) Designated States: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG). Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments. (88) Date of publication of the international search report: 11 November 1999 (11.11.99)</p>
<p>(54) Title: CATHETER FOR DELIVERY OF ENERGY TO A SURGICAL SITE</p>		
<p>(57) Abstract</p> <p>A catheter for delivering energy to a surgical site is disclosed. The catheter includes at a proximal end a handle and at a distal end a probe. The catheter includes at least one energy delivery device and an activation element. The at least one energy delivery device is located at the distal end of the catheter to deliver energy to portions of the surgical site. The activation element is located at the distal end of the catheter, to transition the probe from a linear to a multi-dimensional shape, within the surgical site. Methods for deploying the probe from the linear to multi-dimensional shape are disclosed. In another embodiment of the invention the catheter includes a heating element fabricated on a substrate by photo-etching to deliver thermal energy to portions of the surgical site. In another embodiment of the invention the catheter includes an energy delivery element, a tip and a blade. The energy delivery element is located at the distal end of the catheter to deliver energy to portions of the intervertebral disc. The blade is positioned within a first lumen of the tip and is extensible beyond the tip, to cut selected portions within the intervertebral disc. In another embodiment of the invention a catheter includes both energy and material transfer elements and an interface on the handle thereof. The interface couples the energy delivery element and the material transfer element to external devices for energy and material transfer to and from the intervertebral disc.</p>		

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece			TR	Turkey
BG	Bulgaria	HU	Hungary	ML	Mali	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MN	Mongolia	UA	Ukraine
BR	Brazil	IL	Israel	MR	Mauritania	UG	Uganda
BY	Belarus	IS	Iceland	MW	Malawi	US	United States of America
CA	Canada	IT	Italy	MX	Mexico	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NE	Niger	VN	Viet Nam
CG	Congo	KE	Kenya	NL	Netherlands	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NO	Norway	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	NZ	New Zealand		
CM	Cameroon	KR	Republic of Korea	PL	Poland		
CN	China	KZ	Kazakhstan	PT	Portugal		
CU	Cuba	LC	Saint Lucia	RO	Romania		
CZ	Czech Republic	LJ	Liechtenstein	RU	Russian Federation		
DE	Germany	LK	Sri Lanka	SD	Sudan		
DK	Denmark	LR	Liberia	SE	Sweden		
EE	Estonia			SG	Singapore		

INTERNATIONAL SEARCH REPORT

Internat. Application No

PCT/US 99/06092

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 A61B17/39 A61M25/01

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61B A61M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P,X	WO 98 17190 A (ASHLEY JOHN ; LE LE T (US); SALL JOEL (US); SAAL JEFFREY (US); SHAR) 30 April 1998 (1998-04-30) the whole document	1-20
X	EP 0 737 487 A (CARDIORHYTHM) 16 October 1996 (1996-10-16) abstract; figures 2,5,10	1,8,18, 19
X	EP 0 682 910 A (GUENTHER ANITA ; BERTAGNOLI RUDOLF DR MED (DE); TIEBER FRIEDRICH (D) 22 November 1995 (1995-11-22) column 3, line 31 - line 58 column 5, line 7 - line 19 column 6, line 48 -column 7, line 11; figures 1,3,6,7	1,18



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"Z" document member of the same patent family

Date of the actual completion of the international search

16 June 1999

Date of mailing of the international search report

29. 09. 99

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Hansen, S

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 99/06092

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 279 559 A (BARR IRWIN R) 18 January 1994 (1994-01-18) column 4, line 11 - line 44 claim 1; figure 2 ---	1,4,12
A	WO 96 34559 A (CORDIS WEBSTER INC) 7 November 1996 (1996-11-07) page 6, line 1 -page 8, line 26; figures 1,8 ---	1-3,5,6, 9-11,13, 14,16, 18-20
A	WO 92 05828 A (RAYCHEM CORP) 16 April 1992 (1992-04-16) page 14, line 14 -page 15, line 14; figures 21,212,312,72 abstract ---	1-3,5,6, 8-11,14
A	WO 96 32885 A (DESAI JAWAHAR M) 24 October 1996 (1996-10-24) page 2, line 1 - line 26; figures 2A,2B ---	1,15
A	US 5 415 633 A (LAZARUS KENNETH B ET AL) 16 May 1995 (1995-05-16) abstract; figures 1,5 ---	1,7
A	US 5 152 748 A (CHASTAGNER PHILIPPE) 6 October 1992 (1992-10-06) column 2, line 1 - line 31; figures 2,3 ---	1,4,12
A	US 4 846 175 A (FRIMBERGER ECKART) 11 July 1989 (1989-07-11) abstract; figures 1,2 ---	1,8
A	US 5 114 402 A (MCCOY WILLIAM C) 19 May 1992 (1992-05-19) abstract; figures 1,6,12-14 ---	1,5
A	US 5 433 739 A (SLUIJTER MENNO E ET AL) 18 July 1995 (1995-07-18) cited in the application abstract; figure 1 -----	1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 99/06092

Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.: **claims: 30-33**
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see add. sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-20

Remark on Protest

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 99/06092

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

1. Claims: 1-20

Independent claim 1:

A catheter for delivering energy to an intervertebral disc, said catheter including at an proximal end a handle and at a distal end a probe, said catheter further comprising: at least one energy delivery device located at the distal end of the catheter to deliver energy to portions of the intervertebral disc; and an activation element located at the distal end of the catheter, to transition the probe from a linear to a multi-dimensional shape, within the intervertebral disc.

2. Claims: 21-24

Independent claim 21:

A catheter for delivering energy to an intervertebral disc, said catheter including at a proximal end a handle and at a distal end a probe, said catheter further comprising: a substrate located at the distal end of the catheter; and a heating element adapted to deliver thermal energy to portions of the intervertebral disc, said heating element fabricated on said substrate by a photo-etching.

3. Claims: 25-28

Independent claim 25:

A catheter for delivering energy to an intervertebral disc, said catheter including at a proximal end a handle and at a distal end a probe, said catheter further comprising: a first probe section defining along the length thereof a first lumen; at least one energy delivery element located at the distal end of the catheter to deliver energy to portions of the intervertebral disc; a tip coupled to the first probe section at a terminus thereof, the tip defining on an exterior face a second lumen substantially concentric with said first lumen; and a blade positioned within the first lumen and extensible from a first position with said first probe section to a second position extending through the second lumen and beyond the tip, to cut selected portions within the intervertebral disc.

4. Claim : Claim 29

Independent claim 29:

A catheter for delivering energy to an intervertebral disc, said catheter including at a proximal end a handle and at a distal end a probe, said catheter further comprising: at least one energy delivery element located at the distal end of the catheter to deliver energy to portions of the

INTERNATIONAL SEARCH REPORT

International Application No. PCT/US 99/06092

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

intervertebral disc;
a material transfer element located at the distal end of the catheter to transfer material to and from the intervertebral disc; and at least one interface on the handle for coupling the energy delivery element and the material transfer element to external devices for energy and material transfer to and from the intervertebral disc.

5. Claim : 34

Independent claim 34:

A catheter for delivering energy to an intervertebral disc, said catheter including at a proximal end a handle and at a distal end a probe, said catheter further comprising:
an electrophoretic element located at the distal end of the catheter to alter the milieu within the intervertebral disc.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PC. JS 99/06092

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
WO 9817190	A	30-04-1998	AU 4996097 A	15-05-1998
EP 0737487	A	16-10-1996	US 5318525 A	07-06-1994
			AU 4047993 A	18-11-1993
			DE 69312278 D	21-08-1997
			DE 69312278 T	29-01-1998
			EP 0634941 A	25-01-1995
			WO 9320877 A	28-10-1993
EP 0682910	A	22-11-1995	DE 4417637 A	23-11-1995
US 5279559	A	18-01-1994	WO 9317751 A	16-09-1993
WO 9634559	A	07-11-1996	US 5628313 A	13-05-1997
			US 5782239 A	21-07-1998
			CA 2220071 A	07-11-1996
			EP 0879016 A	25-11-1998
			JP 11504541 T	27-04-1999
			US 5772590 A	30-06-1998
WO 9205828	A	16-04-1992	AU 664358 B	16-11-1995
			AU 8918191 A	28-04-1992
			CA 2093821 A	10-04-1992
			EP 0554361 A	11-08-1993
			JP 6502354 T	17-03-1994
			US 5749879 A	12-05-1998
			US 5720754 A	24-02-1998
			US 5820628 A	13-10-1998
			US 5904690 A	18-05-1999
			US 5601572 A	11-02-1997
			US 5486183 A	23-01-1996
			US 5632746 A	27-05-1997
WO 9632885	A	24-10-1996	WO 9632897 A	24-10-1996
			US 5657755 A	19-08-1997
			AU 697414 B	08-10-1998
			AU 2360695 A	07-11-1996
			AU 5487696 A	07-11-1996
			CA 2197065 A	24-10-1996
			EP 0830091 A	25-03-1998
			EP 0766527 A	09-04-1997
			JP 11503644 T	30-03-1999
US 5415633	A	16-05-1995	AU 7405894 A	28-02-1995
			EP 0712320 A	22-05-1996
			WO 9504556 A	16-02-1995
US 5152748	A	06-10-1992	NONE	
US 4846175	A	11-07-1989	DE 3643362 A	23-06-1988
			AT 72998 T	15-03-1992
			DE 3777135 A	09-04-1992
			EP 0274705 A	20-07-1988
			JP 63288150 A	25-11-1988
US 5114402	A	19-05-1992	US 4944727 A	31-07-1990
			US 4543090 A	24-09-1985
			US 4601705 A	22-07-1986

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT, JS 99/06092

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5114402 A		US 4758222 A	19-07-1988
		AT 108339 T	15-07-1994
		CA 1325938 A	11-01-1994
		DE 3850628 D	18-08-1994
		DE 3850628 T	23-03-1995
		EP 0310295 A	05-04-1989
		JP 1139076 A	31-05-1989
		JP 4041622 B	08-07-1992
		US 5090956 A	25-02-1992
		US 5055101 A	08-10-1986
		CA 1254473 A	23-05-1989
		EP 0199870 A	05-11-1986
		JP 4007229 B	10-02-1992
		JP 61255669 A	13-11-1988
		CA 1263832 A	12-12-1989
		DE 3781214 A	24-09-1992
		EP 0251437 A	07-01-1988
		JP 1807602 C	10-12-1993
		JP 3054593 B	20-08-1991
		JP 62290471 A	17-12-1990
US 5433739 A	18-07-1995	US 5571147 A	05-11-1996